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ABSTRACT

This competency-based curriculum unit on insects and diseases is one of four developed for classroom use in teaching the turf and lawn services area of horticulture. The five sections are each divided into teaching content (in a question-and-answer format) and student skills that outline steps and factors for consideration. Topics covered include root-feeding insects, shoot-feeding insects, and fungicides. A list of references precedes a section containing visual aids, student skill checklist, and student activities, such as handouts, discussion activities, field trips, crossword puzzles, hands-on experiences, worksheets, tests, and quizzes. Answer keys are provided. (KC)

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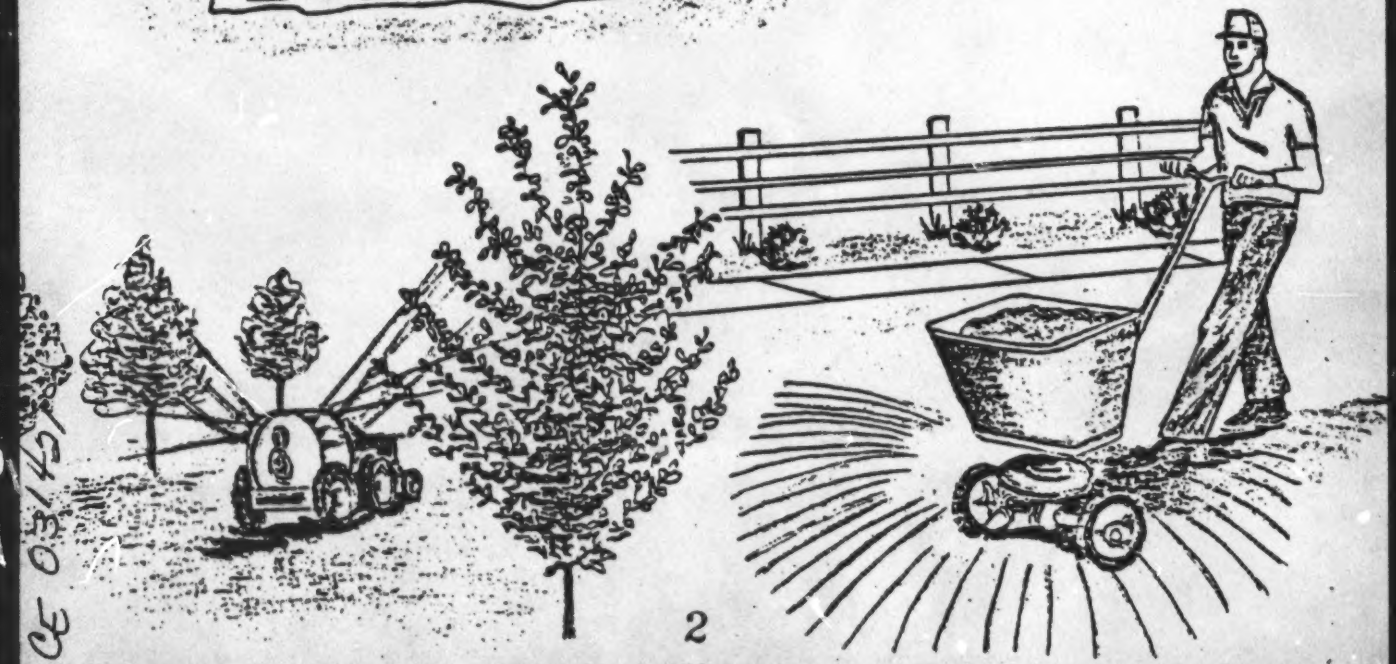
Insects And Diseases

Competency Based Teaching Materials in Horticulture



CE 031 457

Listed below are competency based curriculum units developed for classroom use in teaching horticulture. All units are indexed and include teaching content, references, student activities, a skill check list, and visual aids.

LANDSCAPE/NURSERY Tree Identification Developing a Landscape Plan Implementing the Landscape Plan Maintaining the Landscape Nursery Propagation	GREENHOUSE PRODUCTION & MANAGEMENT Controlling the Greenhouse Environment Greenhouse Soils Foliage Plants Propagation Sales Cut Flower Production Bedding Plants
TURF AND LAWN SERVICES Identification of Turf Grasses Soils and Fertilizers Planting Turf Grasses Insects and Diseases	VEGETABLE PRODUCTION Identification of Cool Season Vegetables Identification of Warm Season Vegetables Vegetable Production Insects, Diseases, and Weeds
FRUIT PRODUCTION (In progress)	

ACKNOWLEDGEMENT

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TURF INSECTS AND DISEASE

Contents

ROOT-FEEDING INSECTS 1

Grubs: life cycle, damage, eradication method
Billbugs: damage, identifying features, types
Mole crickets: damage, reproduction
Wireworms: identifying features, life span, damage

SHOOT-FEEDING INSECTS 2

Sod webworm: reproduction, extent of damage
Armyworms: identifying features, reproduction, feeding habits
Mites: damaging species
Aphid: reproduction, damage
Frit flies: damaging stages, turfgrass types susceptible to damage, method to determine infestation
Chinchbug: feeding patterns, damaging species, identifying features, reproduction
Leafhoppers: growth stages, turf injury
Cutworm: feeding habits, reproduction, damage
Scale insects: identifying features, harmful species
Bluegrass weevil: feeding habits, reproduction, damage

BURROWING INSECTS 7

Periodical cicada: life cycle, damage to turf
Ants: damaging qualities
Bees and Wasps: damaging quality

TURF DISEASES 8

Diseased patches, dollar spots, prevention methods, leaf streaks, identify common diseases

TURF INSECTICIDES AND FUNGICIDES 12

Insecticide types and the insects they destroy, application rates of insecticides and fungicides, use of pesticide equipment

REFERENCES 14

STUDENT ACTIVITIES 15

Turf Insects and Disease

ROOT-FEEDING INSECTS

Teaching content: 12 questions; 1 student skill

Question 1 What types of root-feeding insects harm turf grasses?

- grubs
- billbugs
- mole crickets
- wireworms

Question 2 At what life cycle do grubs feed on turfgrass?

- Adults do not feed on turf
- Larvae (crescent-shaped) feed on turf, especially during late summer and fall

Question 3 How do grubs damage the turfgrass

- They eat a great deal of the root system.

Question 4 What is one method the homeowner can use when destroying grubs?

- Irrigate turf; this will decrease further damage and will promote development of adventitious roots

Question 5 How do billbugs affect the turfgrass system?

- The larvae eat both the roots and stems

Question 6 What are some identifying features of billbug damage?

- Plants turn brown
- Plants pull up easily from soil (especially during summer months)
- a material of sawdust appearance is seen around infestation sites

Question 7 What types of billbugs do the most damage to turfgrasses?

- Phoenix and hunting billbug--bermudagrass and zoysiagrass
- Bluegrass billbug--Kentucky bluegrass

Question 8 How do mole crickets destroy the turf system?

- Eat turfroots--mainly newly seeded turfs
- Uproot younger turf plants which dries out the soil

Question 9 When do mole crickets reproduce?

- In late spring eggs are laid
- Summer--eggs hatch into nymphs
- Nymphs overwinter and mature the next spring

Question 10 What do wireworms look like?

- A cylinder shape
- A hard and wirelike larvae
- About 1 inch in length

Question 11 What is the life span of a wireworm?

- Adults live about 1 year
- They live 2-6 years in the soil

Question 12 What is an identifying feature of wireworm damage?

- Patchy spots of dead looking grass

Student Skill 1

IDENTIFY INSECTS

Steps	Factors for Consideration
1. Examine grass's roots	1. Roots severely pruned so sod can be easily lifted from soil (grubs, billbug, mole cricket, wireworm)

SHOOT-FEEDING INSECTS

Teaching content: 34 questions; 7 student skills

Question 1 What are shoot-feeding insects that destroy turf grasses?

- Sod worms
- Army worms
- Mites
- Aphids
- Frit flies
- Chinchbugs
- Leafhoppers
- Cutworms
- Scale insects
- Annual bluegrass weevils

Question 2 How many generations of sod webworms are produced annually?

Alternatives	Factors for Consideration
1. Spring	- Larvae feeds on grass blades until May when moths emerge
2. Mid-summer	- New generations of larvae appear; last 4-5 weeks until moth emerges
3. Could complete possibly another life cycle before winter, resulting in 2 or 3 annual generations	

Question 3 How extensive can sod webworm damage become?

- Intense feeding will produce great losses of turf

Student Skill 1

IDENTIFY SOD WEBWORM DAMAGE

Steps	Factors for Consideration
1. Inspect upper blades of grass	1. Blades clipped just above sod

Question 4 What do armyworms look like?

- A caterpillar--1.5 inches at adult stage

Question 5 How often do armyworms reproduce?

- 1-6 generations per growing season

Question 6 What is a characteristic of an armyworm's feeding habits?

- Nocturnal feeders

Question 7 Where do female mites deposit their eggs?

- Below sheath of turf

Question 8 What specie of mite causes the greatest amount of damage to turfgrass?

- The bermudagrass mite (Aceria neocynodonis Keifer)

Question 9 How does the bermudagrass mite damage the turf?

- Shortens the internodes

Student Skill 2

IDENTIFY MITE DAMAGE

Steps	Factors for Consideration
1. Examine entire leafblade	1. Blade will have abnormal growth 2. Blade will have shortened internodes

Question 10 How is the birth and reproduction of the greenbug aphid different from most insects?

- Aphids are born alive
- They can reproduce without mating

Question 11 Where is most turfgrass damage from the aphid likely to occur?

- Shaded areas around trees and shrubs

Question 12 What damage does the aphid do to turfgrass?

- The grass appears chlorotic and eventually turns brown and dies
- Death usually occurs from mid-June to September

Student Skill 3

IDENTIFY GREENBUG APHID DAMAGE

Steps	Factors for Consideration
1. Examine types of patches and where located	1. Circular or oval patches appear often beneath shade trees

Question 13 At what stage do frit flies feed on turfgrass?

- The larval stage

Question 14 What are the different stages of the frit fly growth cycle?

- Larvae overwinters in grass stem
- Larvae pupate in spring
- Adult fly emerges
- Female adults lay eggs after mating on turf leaves
- Several generations are produced per growing season

Question 15 What types of turfgrass are most susceptible to frit flies?

- Bentgrass
- Bluegrass

Question 16 How can the homeowner determine if adult frit flies are infesting his turf?

- Put a white object on turf (e.g., piece of paper)
- Many black adults will soon appear since they are attracted to white

Question 17 Why are the feeding patterns of the chinchbug harmful to the turfgrass plant?

- They suck out the fluids from the grass plant
- When the insect's saliva enters the plant, the turf yellows and eventually dies

Question 18 What are the two principal turf chinchbug pests?

- Hairy chinchbug--feeds on cool season turfgrass
- Southern chinchbug--feeds on warm season turfgrass

Question 19 What do chinchbugs look like?

- Adults--1/5" long; black and white with folded wings
- Nymphs--1/20" long; red colored; wingless with a white stripe across the back

Question 20 How do chinchbugs reproduce?

- Female adults insert eggs in leaf sheaths
- Within 10-30 days eggs hatch
- 5 instars (stages between molts) occur between hatching and adulthood

Question 21 Why is damage from the chinchbug less severe in wet years than in dry years?

- Chinchbugs vulnerable to a fungal disease in moist environments

Question 22 How can chinchbug damage be identified?

- Sunlit areas become discolored
- Shaded areas often stay green

Question 23 What is one practice the homeowner can follow to determine if chinchbugs are present in the turfgrass system?

- Put a container (open on both ends) into the turf (e.g., coffee can)
- Fill with water
- Add household detergent
- Chinchbugs will float to the surface in 5-10 minutes if present

Student Skill 4

IDENTIFY CHINCHBUG DAMAGE

Steps	Factors for Consideration
1. Observe leaf color	1. Grass leaves will appear pale green to brown

Question 24 What do the different stages of leafhoppers look like?

- Adults--1/5" long; small, wedge-shaped; fly or jump short distances when disturbed
- Nymphs--resemble adults but are small and wingless

Question 25 How do leafhoppers injure the turfgrass?

- Juices are sucked from the grass; causes discoloration and stunting of growth

Question 26 How many generations of leafhoppers occur each year?

- Many generations per growing season
- Greatest amount reproduced during summer months

Student Skill 5

IDENTIFY LEAFHOPPER DAMAGE

Steps	Factors for Consideration
1. Examine entire blade of grass	1. Grass leaves will appear discolored 2. Grass leaves will have a stunted growth

Question 27 What are the cutworm's feeding habits?

- Devour grass roots

Question 28 How many generations of cutworms are produced each year?

- 1-4, dependent upon specie and climate

Student Skill 6

IDENTIFY CUTWORM DAMAGE

Steps	Factors for Consideration
1. Examine lower blades of grass	1. Grass leaves cut off at or near ground surface

Question 29 What are scale insects?

- Small, almost invisible insects, 1/16" across

Question 30 What does scale-infested turfgrass look like?

- Whitish or moldy appearance on the blades

Question 31 What types of scale insects infect turfgrass?

- Bermudagrass scale: bermudagrass
- Rhodesgrass scale: bermudagrass and St. Augustine grass

Question 32 What are the annual bluegrass weevil's feeding habits like?

- Both larvae and adults feed on blades
- Larvae cause the greatest amount of damage

Question 33 How do annual bluegrass weevils reproduce?

- The adults overwinter to mate
- Eggs are deposited between leaf sheaths of annual bluegrass
- When larvae hatch, grass stems are hollowed out and cut at the base

Question 34 When is weevil damage first visible?

- Late spring

Student Skill 7

IDENTIFY BLUEGRASS WEEVIL DAMAGE

Steps	Factors for Consideration
1. Examine lower blades of grass	1. Grass stems are hollowed out and cut at the base 2. Complete loss on severely infected sites

BURROWING INSECTS

Teaching content: 6 questions; 1 student skill

Question 1 What types of burrowing insects are harmful to turfgrasses?

- Periodical cicadas
- Ants
- Bees and Wasps

Question 2 Why is the life cycle of the periodical cicada considered to be unusual?

- Adults appear every 13-17 years from soil. This causes a lot of holes to be made beneath trees
- After the females mate, they deposit their eggs in twigs of trees
- When eggs hatch, the nymphs fall to the ground and bury themselves into the ground where they feed on tree and shrub roots

Question 3 When does damage to the turf from periodical cicadas occur?

- Every 13-17 years when the nymphs have come out from their burrows

Question 4 Why are periodical cicada nymphs impossible to control?

- They are too deeply located in the soil

Question 5 How do ants destroy the turf's soil?

- They open up a great deal of the soil, mounding it on the surface
- Soil mounding destroys uniformity of soil surface
- Soil mounding dries out the soil
- Soil mounding buries turf plants around nesting sites

Question 6 Why are some species of bees and wasps harmful to turf?

- They burrow into the turf to form nests

Student Skill 1

IDENTIFY BURROWING INSECT DAMAGE

Steps	Factors for Consideration
1. Examine soil surface	1. Soil will be mounded upon surface

TURF DISEASES

Teaching content: 16 questions; 1 student skill

Question 1 What are the shapes of some diseased patches?

- Shapes of patches are elongated, streaks, crescent or circles

Question 2 What can be done to prevent the spreading of the green patches 2-6" in diameter?

Alternatives	Factors for Consideration
1. Cutting	- Raise height of cut during summer
2. Water	- Adequately water entire area
3. Fungicide	

Question 3 What size spots appear on the turf?

- Spots appear as round somewhat sunken areas from 1 - 2 1/2" in diameter (about the size of a silver dollar)

Question 4 What might be found on the outer edge of each patch?

- A grayish-black ring may border spots when moist

Question 5 What might happen to the grass spots if they remain wet throughout the day?

- Small irregular shaped spots ranging from 4-6" in diameter may appear in the morning and if they remain wet by evening, spots may enlarge up to 2-3' in one day

Question 6 How can the round to irregular slimy patches be prevented from spreading?

Alternatives	Factors for Consideration
1. Weather	- In hot weather avoid over-watering, excessive fertilizer and control thatch
2. Fungicide	

Question 7 What measures should be taken to stop dollar spot disease?

Alternatives	Factors for Consideration
1. Cutting	- Keep thatch less than 1/2"
2. Fungicide	- Apply fungicide at regular intervals when disease is active

Question 8 What can be done to prevent the spreading from the outer edge inward?

Alternatives	Factors for Consideration
1. Water-fertilizer	- Avoid overwatering and excessive fertilizer
2. Air	- Improve air circulation
3. Fungicide	

Question 9 What happens to the leaf blade when there is a growth or disease development on it?

- Leaf changes from reddish to chestnut brown or black with blisters or dusty pustules

Question 10 What will deter growth on leaves?

Alternatives	Factors for Consideration
1. Fertilizer	- A light application of fertilizer
2. Water	- Maintain adequate soil moisture, deep during dry periods
3. Fungicide	

Question 11 What are the colors of leaf spots on the leaves of grass?

- Dark brown to reddish-brown to purplish-black spot on leaves. Spots enlarge and develop gray or tan centers.

Question 12 What can be done to prevent round to elongated brown spots on leaves?

Alternatives	Factors for Consideration
1. Fertilizer	- Fertilize to maintain vigor base on a soil test
2. Mow	- Remove no more than 1/3 of leaf surface
3. Fungicide	

Question 13 What color do the leaves turn during progressive disease development?

- As the grass dies, leaves progress to a grayish-white color. Later stages turn a darker grayish-white.

Question 14 What measures can be taken to prevent the appearance of gray to straw colored areas?

Alternatives	Factors for Consideration
1. Mow	- Keep grass mowed until growth stops
2. Barrier	- Erect snow barriers where drifts occur each year
3. Fungicide	

Question 15 What color are the streaks that appear in the leaves?

- Infected plants develop long yellow-green streaks on the leaves which gradually assume a silvery-gray appearance.

Question 16 What measures should be followed to prevent streaks in leaves?

Alternatives	Factors for Consideration
1. Seeds	- Overseed with tolerant grasses
2. Mow	- Keep thatch to 1/2" or less
3. Fungicide	

Student Skill 1

IDENTIFY COMMON DISEASES

Steps	Factors for Consideration
1. Examine area of turf	- Scattered, light green patches, 2-6" across that soon enlarge, turn tan, finally straw-colored (Fusarium blight)
2. Examine area of grass	- Roundish, straw-colored spots 1 - 2 1/2" across (Dollar spot)
3. Check edge of patch	- A grayish-black ring may border spots when moist; round, light-brown patches up to 2 or 3' across (Brown Patch)
4. Examine blades of grass	- Oval to elongated, yellow to orange, reddish to chestnut brown or black dusty pustules on leaves (Rusts)
5. Examine middle of grass blade	- Leaf appears purplish-red spot or a dull white or straw-colored spot with brown edges. Usually die back from tip (Leaf Spot)
6. Examine melting snow	- Seen where snow is melting Grass covered with fluffy, white to bluish-gray mold or a silvery membraneous crust (Gray snow mold)
7. Examine grass color	- Dull gray streaks in leaves and sheaths. Streaks rupture exposing black masses of smut spores (Stripe Smut)
8. Examine area of grass	- Round to irregular, water-soaked, greasy or slimy patches, up to 6" across (Pythium Blight)

TURF INSECTICIDES AND FUNGICIDES

Teaching content: 3 questions; 1 student skill

Question 1 What are the names of the insecticides and what insects do they destroy?

- Insecticide diazinon - (white grub)
- Insecticide carbaryl, diazinon, chlorpyrifos and aspon (sod webworm)
- Insecticide chlorpyrifos and aspon (chinchbug)
- Insecticide chlorpyrifos (cutworm)
- Insecticide malathion (Aphid)

Question 2 What are the application rates of turf insecticides?

Alternatives	Factors for Consideration
1. White grub	- Apply as spray or granules to small area and then water in thoroughly before treating another small area
2. Sod webworm	- Use at least 2.5 gal. water per 1000 sq. ft. Do not water for 72 hrs. after treatment
3. Cutworms	- Apply as sprays or granules. Use 5 to 10 gal. of water per 1000 sq. ft.
4. Chinchbugs	- Spray infested areas where bugs are present
5. Aphids-Greenbug	- Spray grass thoroughly

Question 3 What are the application rates of turf fungicides?

Alternatives	Factors for Consideration
1. Fusarium Blight	- Apply Tersan 1991 at rate of 5-8 oz. per 1000 sq. ft. and repeat 7-10 days. Water well
2. Dollar Spot	- Apply Tersan 1991 at 1 oz/1000 sq. ft. It should be used in conjunction with Tersan 75 at 3 oz/1000 sq. ft.
3. Brown Patch	- Apply Tersan 1991 at rate of 2 oz/1000 sq. ft. Follow with 3-4 oz. per 1000 sq. ft. of Tersan 75 or Tersan LSK.
4. Rust	- Apply Tersan LSK at rate of 3-4 oz/ 1000 sq. ft. Apply some nitrogen to get turf growing.
5. Helminthosporium Leaf Spot	- Apply Tersan LSK early as possible at rate of 3-4 oz/1000 sq. ft. Repeat at 7-10 day intervals as long as disease persists

6. Gray Snow Mold	- Apply Tersan SP in late Oct. or early Nov. at rate of 6-9 oz/1000 sq. ft. in as little water as needed to get complete coverage.
7. Stripe Smut	- Apply Tersan 1991 at rate of 6 oz/ 1000 sq. ft. between Oct. and early spring, before grass starts to show color and water well.
8. Pythium Blight	- Apply Tersan SP at rate of 4 oz/1000 sq. ft. in 3-5 gal. water.

Student Skill 1

DEMONSTRATE SAFE HANDLING OF PESTICIDE EQUIPMENT

Steps	Factors for Consideration
1. Protective clothing & equipment	1. Protect skin--applicator must wear a protective barrier: gloves, boots, goggles and head and neck covering.
2. Put on proper clothing & equipment	2. Wear clean clothing each day you spray. If fabrics get wet during spraying, change. Wash all equipment daily and separate from regular clothes.
3. Check respirator	3. Use where label indicates a respirator is needed.
4. Mix and load pesticides	4. Put on correct protective clothing. Should be mixed out-of-doors with good ventilation and light. When pouring, keep container below eye level. If spilled, remove clothing; wash thoroughly with soap and water. Important that soap and water be near mixing area.
5. Apply pesticides	5. Avoid exposure--don't work in spray drift or runoff. Avoid sensitive areas; beehives, lakes, houses, playgrounds, etc. Avoid drift--check weather conditions and high winds.
6. Pesticide clean-up	6. Immediately after use, clean equipment thoroughly. Take shower end of day.
7. Store pesticides	7. Should be stored in a locked and posted facility where children and other untrained people cannot get to them.

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STUDENT ACTIVITIES

KEY TO PLANT-NUTRIENT DEFICIENCY SYMPTOMS

	Element Deficient
A. Parasitic and virus diseases disseminated by bacteria, fungi or virus entities (excluded from present discussion).	
A. Non parasitic troubles; never infectious; caused by element deficiencies.	
1. Older or lower leaves of plant mostly affected; effects localized or generalized.	
a. Effects mostly generalized over whole plant; more or less drying or firing of lower leaves; plant light or dark green.	
1) Plant light green; lower leaves yellow, drying to light brown color; stalks short and slender if element is deficient in later stages of growth	Nitrogen
2) Plant dark green, often developing red and purple colors; lower leaves sometimes yellow, drying to greenish brown or black color; stalks short and slender if element is deficient in later stages of growth	Phosphorus
b. Effects mostly localized; mottling or chlorosis with or without spots of dead tissue on lower leaves; little or no drying up of lower leaves.	
1) Lower leaves mottled or chlorotic, with or without dead spots; leaf margins sometimes tucked or cupped upward or downward.	
a) Mottled or chlorotic leaves typically, may redden, as with cotton; sometimes with dead spots; tips and margins turned or cupped upward; stalks slender	Magnesium
b) Mottled or chlorotic leaves with large or small spots of dead tissue.	
i) Spots of dead tissue small, usually at tips and between veins, more marked at margins of leaves; stalks slender	Potassium
ii) Spots generalized; rapidly enlarging, generally involving areas between veins and eventually involving secondary and even primary veins; leaves thick; stalks with shortened internodes..	Zinc
2. Newer or bud leaves affected; symptoms localized.	
a. Terminal bud dies, following appearance of distortions at tips or bases of young leaves.	
1) Young leaves of terminal bud at first typically hooked, finally dying back at tips and margins, so that later growth is characterized by a cut-out appearance at these points; stalk finally dies at terminal bud	Calcium

1) Young leaves of terminal bud becoming light green at bases, with final break down here; in later growth, leaves become twisted; stalk finally dies back at terminal bud ..... Boron

b. Terminal bud commonly remains alive; wilting or chlorosis of younger or bud leaves with or without spots of dead tissue; veins light or dark green.

1) Young leaves permanently wilted (wither-tip effect) without spotting or marked chlorosis; twig or stalk just below tip and seedhead often unable to stand erect in later stages when shortage is acute ..... Copper

2) Young leaves not wilted; chlorosis present with or without spots of dead tissue scattered over the leaf.

a) Spots of dead tissue scattered over the leaf; smallest veins tend to remain green, producing a checkered or reticulated effect ..... Manganese

b) Dead spots not commonly present; chlorosis may or may not involve veins, making them light or dark green in color.

i) Young leaves with veins and tissue between veins light green in color ..... Sulphur

ii) Young leaves chlorotic, principal veins typically green; stalks short and slender .... Iron

J. E. McMurtrey, Jr., Diagnostic Techniques for Soils and Crops. The American Potash Institute, 1948.

MANAGEMENT PRACTICES THAT HELP PREVENT LAWN DISEASES

These practices are general guides to be used according to one's judgment. Their importance depends on the kind and seriousness of the disease threat. Not all of them are practicable under all conditions.

- Select grass species best adapted to the soil, climatic, and light conditions under which they will be grown.
- Plant mixtures of recommended grasses. Species vary in their susceptibility to different disease organisms, and in a mixture one or more of the grasses usually will survive a severe disease attack.
- Do not clip upright-growing grasses such as Kentucky bluegrass and red fescue too closely—1½ to 2 inches is the best height. Creeping grasses such as bentgrass and zoysia may be clipped at ½ inch or less.
- Mow the grass before it gets too tall; not more than one-half of the leaf surface should be removed at one time.
- Mow the lawn frequently enough in the fall to prevent the accumulation of a thick mat of grass before snow comes.
- Apply enough fertilizer to keep grass vigorously growing, but avoid overstimulating the grass with nitrogen. Apply lime if soil tests indicate a need for it.
- Clippings need not be removed except on heavily fertilized lawns or during periods when the grass is growing rapidly. Clippings provide nutrients for fungi and help to maintain humidity long after the sun has dried off surrounding uncovered areas.
- Water early enough in the day to allow grass leaves time to dry out before night. Avoid frequent, light waterings, especially during warm weather.
- Do not water grass until it begins to wilt, then soak the soil to a depth of 6 inches or more. Provide good surface drainage.

Science and Education Administration. Lawn Diseases - How to Control Them (Revised). Washington, D.C.: U.S. Government Printing Office, Home and Garden Bulletin 61, 1979.

Read the entire pesticide label
It tells you

- **—what the chemical is**
- **—the diseases it controls**
- **—grass species on which to use it**
- **—how much to use**
- **—when to use**

Apply only as directed

- **—controls will be more effective**
- **—chances of plant injury are reduced**

Handle pesticides carefully

- **—take proper precautions with children and pets**
- **—avoid drift**
- **—wear protective clothing if specified**
- **—clean-up immediately after application**
- **—safely dispose of empty containers**
- **—keep and store in the original labeled containers out of the reach of children and irresponsible adults**

Science and Education Administration. Lawn Diseases - How to Control Them (Revised). Washington, D.C.: U.S. Government Printing Office, Home and Garden Bulletin 61, 1979.

TURF INSECTS AND DISEASES

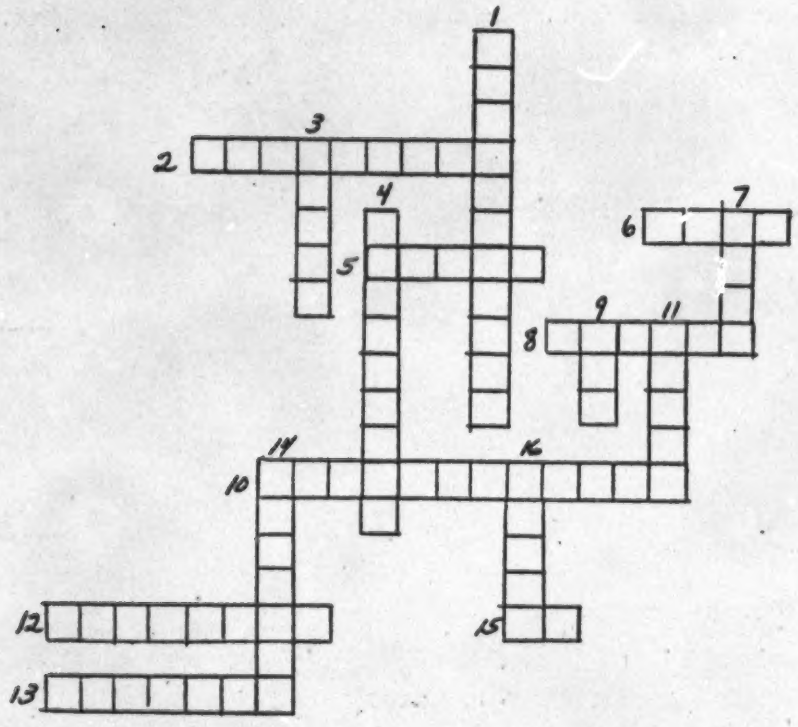
Student Skill Checklist

Evaluation form for identifying diseases.

	Max. Score	Your Score
1. Are there scattered, light green patches, 2" to 6" across that enlarge and turn a straw color?	10	
2. Do the spots appear roundish 1" to 2 1/2" in diameter?	10	
3. Does a grayish-black ring appear bordering spots in moist environments?	10	
4. Are there oval to elongated spots usually yellow to orange or reddish to chestnut in color?	10	
5. Do the leaves appear purplish to red or dull white with brown edges?	10	
6. Is grass covered with fluffy white to bluish-gray mold after snow melts?	10	
7. Do the leaves have dull gray streaks when they rupture, thus exposing black spores?	10	
8. Are round to irregular, water-soaked, greasy patches present?	10	
	Total 80	

TURF INSECTS AND DISEASES

Crossword Puzzle



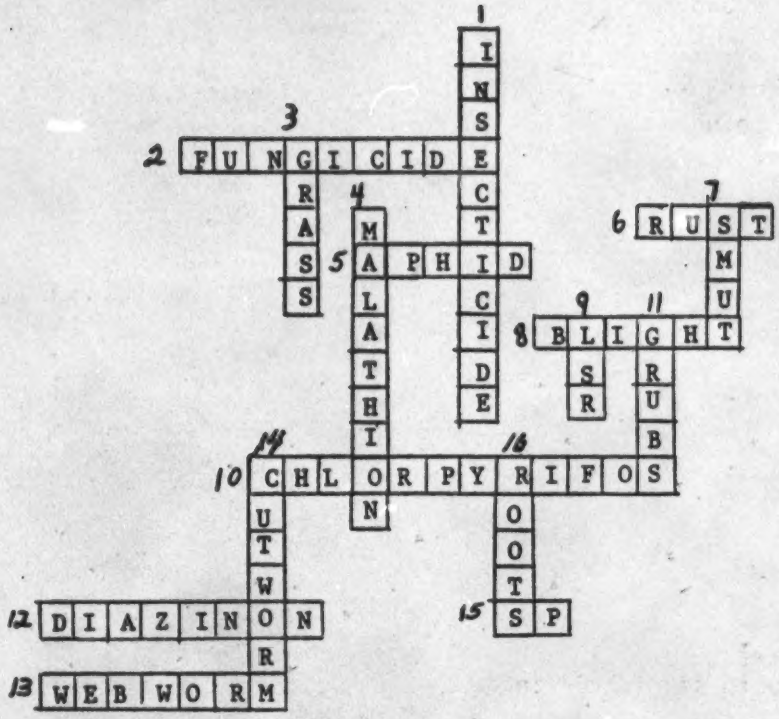
Down

1. Used to control insects
3. Can be destroyed by insects or diseases
4. An insecticide used to kill aphids
7. A disease that causes long yellow-green streaks on plants
9. A fungicide used to kill leaf spot
11. Will chew grass leaves off at,or near the ground surface
14. An insect that severely prunes grass roots
16. White grubs usually destroy these severely

Across

2. Used to control diseases
5. An insect that leaves circular to oval patches, often beneath trees
6. First seen as light yellow flecks, will turn to reddish-brown pustules
8. Irregular shaped spots that can enlarge up to 2 or 3 feet in one day
10. An insecticide used to kill cutworms
12. This insecticide destroys white grubs
13. This insect will clip the blades just above the sod
15. A fungicide used to destroy pythium blight

PLANT CROSSWORD KEY



TURF INSECTS AND DISEASES

Quiz

Multiple Choice:

1. What insect cuts grass leaves off at or near the ground surface?

   a. white grub
   b. sod webworm
   c. cutworm
   d. aphid
   e. chinch bug

2. Identify the insect that severely prunes the grass roots resulting in the sod being easily lifted from the soil?

   a. white grub
   b. cutworm
   c. sod webworm
   d. aphid
   e. chinch bug

3. Which of the following insecticides is used to destroy white grubs?

   a. chlorpyrifos
   b. diazinon
   c. aspon
   d. malathion
   e. carbaryl

4. The insecticide malathion is used primarily to destroy what insects?

   a. billbugs
   b. sod webworms
   c. mole crickets
   d. grubs
   e. none of the above

5. What disease leaves a round to irregular, water-soaked, greasy or slimy patch up to six inches in diameter on the blade?

   a. pythium blight
   b. stripe smut
   c. fusarium blight
   d. dollar spot
   e. rust

6. Identify the type of damage dollar spot does to turf.

   a. dull gray streaks rupture, leaving black masses of spores
   b. leaves appear purplish to red with leaves dying back from tip
   c. scattered light green notches finally turn straw color
   d. roundish, straw-colored spots one to two inches across

7. The turf fungicide tersan 1991, made by DuPont, will destroy which of the following diseases?

   a. dollar spot
   b. rust
   c. stripe smut
   d. pythium blight
   e. all of the above

8. Which of the following fungicides will destroy rust?

a. Tersan LSR
b. Tersan 75
c. Tersan SP
d. Tersan 1991
e. Tersan 1991 and 75

9. A chemical used to destroy, prevent, or control pests:

a. insecticide
b. fungicide
c. pesticide
d. herbicide
e. b and d

10. In the safety handling of pesticides, one must consider exposure when:

a. transporting
b. storing
c. mixing
d. loading
e. all of the above